

**LISTING OF THE CLAIMS**

Claim 1 (Currently Amended) A method of substantially reducing the number of tile or divot defects that are present in a silicon-on-insulator (SOI) substrate, said method comprising the steps of:

(a) implanting oxygen ions into a surface of a Si-containing substrate utilizing a base oxygen implant followed by a second oxygen implant, said second oxygen implant is carried out at a temperature lower than the base oxygen implant, said implanted oxygen ions having a concentration sufficient to form a buried oxide region during a subsequent annealing step;

(b) annealing said substrate containing said implanted oxygen ions in an ambient gas that comprises from about 0 to about 90% oxygen and from about 10 to about 100% of N<sub>2</sub> at a temperature of about 1250°C or greater to form said buried oxide region which electrically isolates a superficial Si-containing layer from a bottom Si-containing layer, wherein said annealing is carried out until tile or divot defects present at a top surface of said superficial Si-containing layer are reduced in terms of tile enlargement and divot number reduction, respectively, thereby permitting for optical detection of other defects that have a lower density than said tile or divot defects so as to allow optical detection of any other defect that has a lower density than the tile or divot defect; and

(c) optically detecting said other defects in said superficial Si-containing layer that have said lower density than said tile or divot defects.

Claim 2 (Cancel)

Claim 3 (Previously Presented) The method of Claim 1 wherein said second oxygen implant step is carried out using an oxygen dose of from about 1E14 to about 1E16 cm<sup>-2</sup> and at an energy of about 40 keV or greater.

Claim 4 (Original) The method of Claim 3 wherein said second oxygen implant step is carried out using an oxygen dose of from about 1E15 to about 4E15 cm<sup>-2</sup> and at an energy of from about 120 to about 450 keV.

Claim 5 (Previously Presented) The method of Claim 1 wherein said second oxygen implant step is carried out at a temperature of from about 4K to about 200°C at a beam current density of from about 0.05 to about 10 mA cm<sup>-2</sup>.

Claim 6 (Original) The method of Claim 5 wherein said second oxygen implant step is carried out at a temperature of from about 25° to about 100°C at a beam current density of from about 0.5 to about 5.0 mA cm<sup>-2</sup>.

Claim 7 (Previously Presented) The method of Claim 1 wherein said base oxygen implant comprises a high-dose oxygen implant which is carried out using an oxygen dose of about 4E17 cm<sup>-2</sup> or greater.

Claim 8 (Original) The method of Claim 7 wherein said high-dose oxygen implant is performed using an oxygen dose of from about 4E17 to about 4E18 cm<sup>-2</sup>.

Claim 9 (Original) The method of Claim 7 wherein said high-dose oxygen implant is carried out at an energy of from about 10 to about 1000 keV.

Claim 10 (Original) The method of Claim 9 wherein said high-dose oxygen implant is carried out at an energy of from about 120 to about 210 keV.

Claim 11 (Original) The method of Claim 7 wherein said high-dose oxygen implant is carried out at a temperature of from about 200° to about 800°C at a beam current density of from about 0.05 to about 500 mA cm<sup>-2</sup>.

Claim 12 (Original) The method of Claim 11 wherein said high-dose oxygen implant is carried out at a temperature of from about 200° to about 600°C at a beam current density of from about 4 to about 8 mA cm<sup>-2</sup>.

Claim 13 (Previously Presented) The method of Claim 2 1 wherein said base oxygen implant comprises a high-energy, high-dose oxygen implant which is carried out using an oxygen ion dose of about 4E17 cm<sup>-2</sup> or greater and at an energy of about 60 keV or greater.

Claim 14 (Original) The method of Claim 13 wherein said high-energy, high-dose oxygen implant is carried out using an oxygen ion dose of from about 5E17 to about 7E17 cm<sup>-2</sup> and at an energy of from about 200 to about 500 keV.

Claim 15 (Original) The method of Claim 13 wherein said high-energy, high-dose oxygen implant is performed at a temperature of from about 100° to about 800°C at a beam current density of from about 0.05 to about 500 mA cm<sup>-2</sup>.

Claim 16 (Original) The method of Claim 15 wherein said high-energy, high-dose oxygen implant is performed at a temperature of from about 300° to about 700°C.

Claim 17 (Previously Presented) The method of Claim 1 wherein said base oxygen implant comprises a low-dose oxygen implant which is carried out using an oxygen dose of about 4E17 cm<sup>-2</sup> or less.

Claim 18 (Original) The method of Claim 17 wherein said low-dose oxygen implant is performed using an oxygen dose of from about 1E17 to about 3.9E17 cm<sup>-2</sup>.

Claim 19 (Original) The method of Claim 17 wherein said low-dose oxygen implant is carried out at an energy of from about 20 to about 10000 keV.

Claim 20 (Original) The method of Claim 19 wherein said low-dose oxygen implant is carried out at an energy of from about 100 to about 210 keV.

**Claim 21 (Original)** The method of Claim 17 wherein said low-dose oxygen implant is carried out at a temperature of from about 100° to about 800°C.

**Claim 22 (Original)** The method of Claim 21 wherein said low-dose oxygen implant is carried out at a temperature of from about 200° to about 650°C at a beam current density of from about 0.05 to about 500 mA cm<sup>-2</sup>.

**Claims 23-24 (Cancelled)**

**Claim 25 (Previously Presented)** The method of Claim 1 wherein said ambient gas comprises 100% N<sub>2</sub>.

**Claim 26 (Previously Presented)** The method of Claim 1 wherein said ambient gas is admixed with Ar.

**Claim 27 (Previously Presented)** The method of Claim 1 wherein said annealing step is carried out for a time period of from about 1 to about 100 hours.

**Claim 28 (Previously Presented)** The method of Claim 1 wherein said annealing step is carried out at a temperature of from about 1300° to about 1350°C for a time period of from about 2 to about 24 hours.

**Claim 29 (Previously Presented)** The method of Claim 1 wherein said annealing step includes a ramp and soak-heating regime.

**Claim 30 (Previously Presented)** The method of Claim 1 wherein said annealing step comprises the steps of: partially annealing the Si-containing substrate containing the implanted oxygen ions in oxygen so as to form a surface layer of oxygen on the Si-containing and to partially form said BOX region; stripping the surface layer of oxygen; and continuing the annealing in said oxygen and N<sub>2</sub> gas ambient to complete formation of said BOX region.

**Claim 31 (Original)** The method of Claim 30 wherein said partially annealing is carried out in an ambient that comprises from about 1 to about 100% oxygen and from about 0 to about 99% inert gas.

**Claim 32 (Original)** The method of Claim 31 wherein said inert gas comprises He, Ar, Kr, N<sub>2</sub> or mixtures thereof.

**Claim 33 (Previously Presented)** The method of Claim 31 wherein said ambient gas comprises N<sub>2</sub> or a mixture of N<sub>2</sub> and Ar.

**Claim 34 (Original)** The method of Claim 30 wherein said partial annealing is performed at a temperature of from about 1250° to about 1400°C for a time period of from about 1 to about 100 hours.

Claim 35 (Original) The method of Claim 34 wherein said partial annealing is performed at a temperature of from about 1320° to about 1350°C for a time period of from about 2 to about 20 hours.

Claim 36 (Original) The method of Claim 30 wherein said surface layer of oxygen is removed utilizing a wet etch process that includes an etchant that has a high-selectivity for removing oxide compared with Si.

Claims 37-39 (Cancelled)

Claim 40 (Original) The method of Claim 1 further comprising applying a patterned resist to the surface of the SOI wafer prior to oxygen implantation.

Claims 41-47 (Cancelled)

Claim 48 (Previously Presented) The method of Claim 31 wherein said inert gas comprises He, Kr, H<sub>2</sub> pr mixtures thereof.

Claim 49 (Currently Amended) A method of substantially reducing the number of tile or divot defects that are present in a silicon-on-insulator (SOI) substrate, said method comprising the steps of:

implanting oxygen ions into a surface of a Si-containing substrate utilizing a base oxygen implant followed by a second oxygen implant, said second oxygen implant is carried out at a temperature lower than the base oxygen implant, said implanted oxygen ions having

a concentration sufficient to form a buried oxide region during a subsequent annealing step;

annealing said substrate containing said implanted oxygen ions in an ambient gas that comprises from about 0 to about 90% oxygen and from about 10 to about 100% of a high mobility gas selected from the group consisting of He, Kr, H<sub>2</sub> and mixtures thereof at a temperature of about 1250°C or greater to form said buried oxide region which electrically isolates a superficial Si-containing layer from a bottom Si-containing layer, wherein said annealing is carried out until tile or divot defects present at a top surface of said superficial Si-containing layer are reduced in terms of tile enlargement and divot number reduction, respectively, thereby permitting for optical detection of other defects that have a lower density than said tile or divot defects so as to allow optical detection of any other defect that has a lower density than the tile or divot defect; and

optically detecting said other defects in said superficial Si-containing layer having said lower density than the tile or divot defects.

Claim 50 (Cancelled)

Claim 51 (Previously Added) The method of Claim 1 wherein said second oxygen implant is omitted.

Claim 52 (Previously Added) The method of Claim 49 wherein said second oxygen implant is omitted.